214 Driveways

214.1 General

This chapter provides driveway design criteria and requirements for connections to the State Highway System. The ***FDOT Access Management Guidebook*** provides further guidance and information on driveways and medians. For additional information and definitions, including Connection Categories, and requirements for obtaining access to the State Highway System, refer to:

- ***Florida Administrative Code (F.A.C.)***, ***Rule 14-96 (State Highway Connection Permits)*** and
- ***Rule 14-97, F.A.C. (State Highway System Access Control Classification System and Access Management Standards)***.

This criteria applies to new construction, reconstruction, and Resurfacing, Restoration and Rehabilitation (RRR) projects. New Construction criteria must be met for new and reconstruction projects, and for proposed improvements included within RRR projects. For RRR Projects, unaltered driveways that are not in compliance with the new construction criteria in this chapter, ***Standard Plans,*** or ADA requirements are not required to be reconstructed.

The terms “driveway”, “connection”, and “turnout” are used in various FDOT manuals, handbooks, and guides. A driveway is an access constructed within a public R/W connecting a public road with adjacent property. The intent is to provide vehicular access in a manner that will not cause the blocking of any sidewalk, border area, or roadway. The term “connection” encompasses a driveway or side road and its appurtenances:

- islands,
- separators,
- transition tapers,
- auxiliary lanes,
- travel way flares,
- drainage pipes and structures,
- crossovers,
- sidewalks,
- curb cut ramps,
- signing,
- pavement marking,
- required signalization,
- maintenance of traffic or
- other means of access to or from controlled access facilities.

The term “turnout” is typically used to describe the portion of the driveway or side road adjoining the outer roadway (maintained or constructed by the Department). The terms “driveway” and “connection” are used in this chapter.

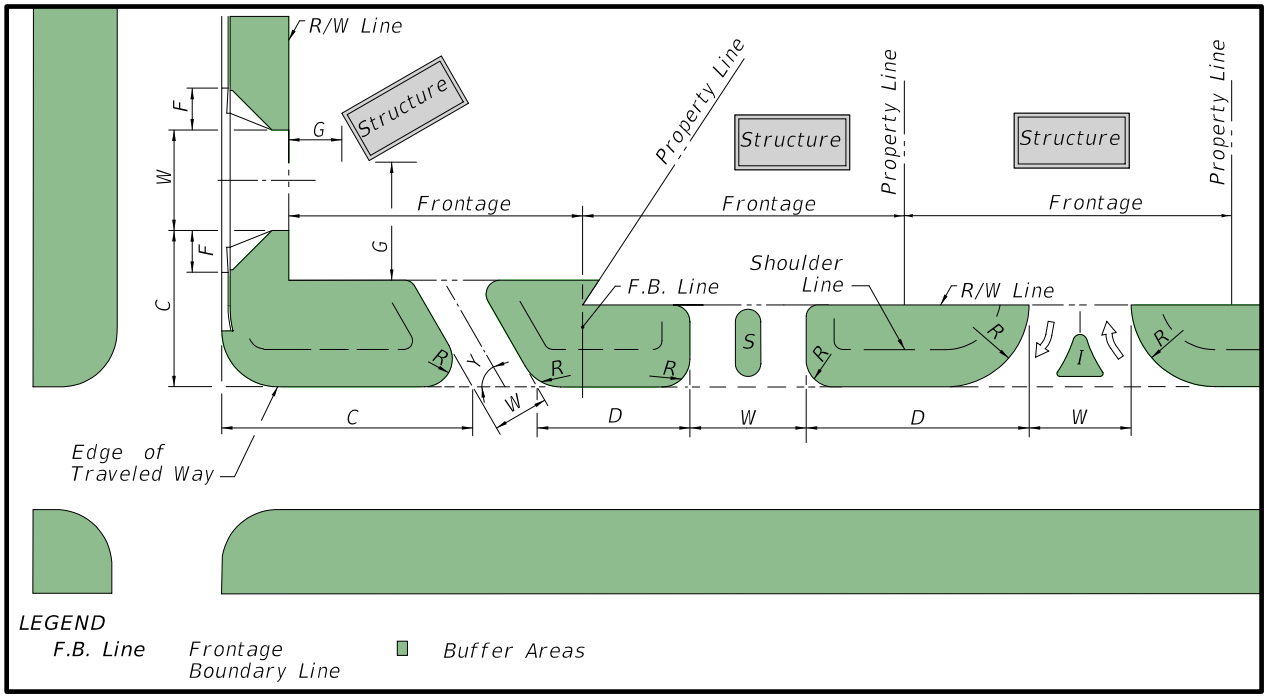
Driveways should be located and designed to improve the mobility and safety of all road users. The location and design of the connection must consider potential users, context classification, and site conditions.

This Chapter includes considerations and requirements for the design of driveways defined as Connection Categories A, B, C, or D (see ***FDM 214.1.1***). Connection Categories E, F and G (i.e., traffic volume >4,000 trips/day) are designed as Intersections in accordance with ***FDM 212***. Side road intersection design, with possible auxiliary lanes and channelization, may be necessary for Connection Category C and D.

214.1.1 Driveway Terminology

Figure 214.1.1 provides a schematic of typical driveway types and the associated terminology. The terms shown in this section are standard terms or variables used within this chapter.

Figure 214.1.1 Driveway Terminology



Radius (R) – The radial dimension of curved driveway entry or exit

Flare (F) – The total length of angled approach/exit at the edge of roadway for a flared driveway

Driveway Connection Width (W) – Effective width of the driveway, measured between the left edge and the right edge of driveway

Driveway Connection Spacing (D) – Spacing between driveways from the projected edge line of each driveway (see connection spacing in ***Tables 201.3.2*** and ***201.3.3***)

Corner Clearance (C) – Distance from an intersection, measured from the projected closest edge line of the intersecting roadway to a driveway projected edge line (see connection spacing in ***Tables 201.3.2*** and ***201.3.3***)

Angle (Y) – Angle of the driveway between the driveway centerline and the roadway edge of traveled way.

Setback (G) – Distance from the R/W line to the closest permanent structure

Driveway Location – Position of driveway in relation to other traffic features such as intersections, neighboring driveways, median openings, and interchanges

Driveway Length – Distance needed into the site to transition vehicles to the internal circulation system of the site.

Driveway Traffic Separator (S) – Linear islands or raised medians used to separate traffic movements on the driveway.

Channelization Island (I) – Used to facilitate right turns and discourage left turn movements on the driveway.

Connection (Driveway) Category (A through D) are defined as follows:

- A – 1-20 trips/day or 1-5 trips/hour.
- B – 21-600 trips/day or 6-60 trips/hour.
- C – 601-1,200 trips/day or 61-120 trips/hour.
- D – 1,201-4,000 trips/day or 121-400 trips/hour.

Design driveways based on the expected volume and type of traffic. See the ***FDOT Access Management Guidebook*** for descriptions of these categories.

214.1.2 Evaluation of Existing Driveways

Evaluate existing driveways to ensure the design properly balances safety, accessibility, and mobility. The following existing roadway elements play a role in locating driveways on roadway improvement projects:

- medians
- median openings
- adjacent driveways
- traffic signals
- adjacent highway features
- adjacent intersection

Perform a corridor analysis to determine if existing connections, median openings and signal spacing are in conformance or can be brought into conformance with Department standards. See ***FDM 201.3*** for Access Management requirements.

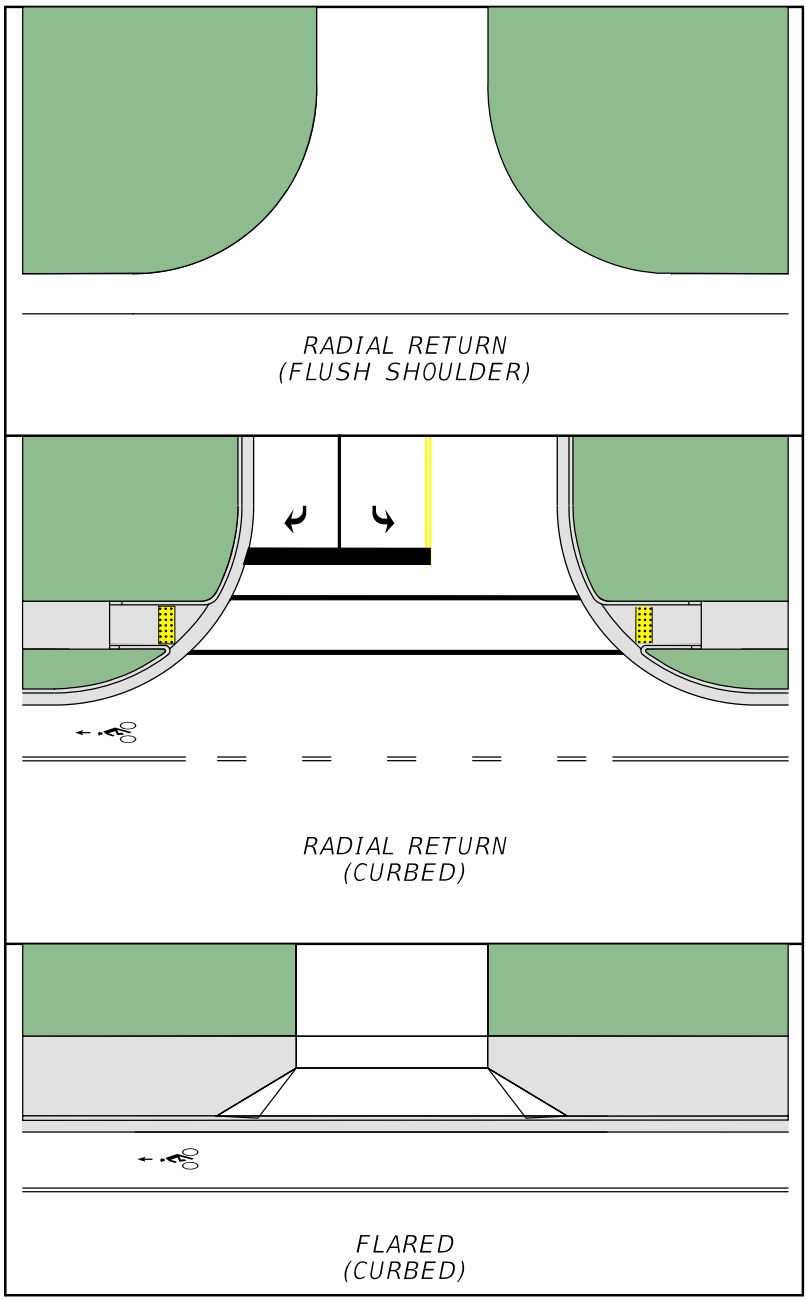
Each district has an **Access Management Review Committee** (AMRC), to review deviations from spacing standards of more than 10% for full median openings. The AMRC members are appointed by the District Secretary and consists of head level positions within the District. AMRCs in the districts provide guidance on access management and median decisions. Interested persons may also appear before the AMRC during the project development stage. (See ***Section 335.181(2), Florida Statutes*** and ***Rule 14-96.002(25), F.A.C.***).

When a connection is proposed to be modified as part of a Department project, notice of the Department's intended action will be provided to the property owner pursuant to ***Rule 14-96.011(2), Florida Administrative Code***. Property owners have the right to request an administrative hearing. If a hearing is requested, the Department will offer to schedule a meeting on site to consider documents, reports, or studies obtained by the property owner with regards to safety and operational concerns.

214.2 Flared and Radial Return Designs

Driveway connections on the State Highway System use either a flared or a radial return design. Examples of each type are shown in ***Figure 214.2.1***.

Figure 214.2.1 Flared and Radial Return Driveway Examples



Determine the type of driveway needed based on roadway type (curbed or flush shoulder) and driveway traffic volumes. Flared driveways are used on curbed roadways where driveway traffic does not exceed 600 trips per day or 60 trips per hour (i.e., Connection Categories A and B) as shown in ***Table 214.2.1***. Radial return designs are used on all flush shoulder roadways and on curbed roadways with driveway traffic greater than 600 trips per day (i.e., Connection Category C and D).

Provide radial returns for driveways requiring or having a specified median opening with left turn storage and served directly by that opening.

Table 214.2.1 Flared or Radial Driveway

Element Description	Connection Category		
	A	B	C and D
		2-Way	2-Way
Curbed Roadways	Flared	Flared	Radius
Flush Shoulder Roadways	Radius	Radius	Radius

Notes:

1. Connection Categories A, B, C, and D are defined in ***FDM 214.1.1***.
2. Small radii may be used in lieu of flares for curbed roadways with Category B Connections when approved by the Department.

Modification for Non-Conventional Projects:
Delete note 2 from ***Table 214.2.1*** and see RFP for requirements.

Flared or radial return design determines driveway entry and exit speeds and turning movements. Larger radius or flare allows for quicker and more efficient vehicle access. This reduces interference with traffic on the major roadway. Pedestrians may be impacted due to larger driveway openings (e.g., higher vehicle entry speeds, increased crossing time).

Consider the following to determine which type of driveway is needed:

- Design speed of roadway
- Driveway traffic volume
- Entry and exit movements (e.g., one-way, two-way, right-in/right-out)
- Available R/W
- Design Vehicle

R/W may be limited in C2T – C6 Context Classifications.

A CADD-based vehicle turning path program (e.g., AUTOTURN) is often used to determine the driveway type and dimensions for the appropriate design vehicle.

Requirements for driveway profiles connected to curbed or flush shoulder roadways are provided in ***FDM 214.4***.

For additional information and details on flared driveways see ***Standard Plans, Index 522-003*** and for paved radial driveways see ***Standard Plans, Index 330-001***.

214.3 Driveway Horizontal Geometry

Driveway horizontal geometry should be consistent with the context classification, roadway type (curbed or flush shoulder), driveway traffic volumes, driveway design vehicle, and access classification. This section contains the following design elements for driveway horizontal geometry:

- Radius
- Driveway Width
- Angle of Driveway
- Driveway Traffic Separator and Channelization Island
- Driveway Length
- Driveway Location

Each driveway element listed above is further discussed in the subsequent sections. ***Table 214.3.1*** contains driveway dimensions for the horizontal geometry elements. This table also provides the requirements for the elements in ***Figure 214.1.1***.

Table 214.3.1 Driveway Dimensions

Element	Description	Connection Category		
		A	B	C and D
			2-Way	2-Way
Curbed Roadways				
W	Connection Width	12’ Min 24’ Max	24’ Min 36’ Max	24’ Min 36’ Max
F	Flare (Drop Curb)	10’ Min	10’ Min	N/A
R	Radial Returns (Radius)	N/A	See Note 3	25’ Min 50’ Std 75’ Max
Y	Angle of Driveway	60°- 90°	60°- 90°	60°- 90°
S	Driveway Traffic Separator or Median	N/A	4’-22’ Wide	4’-22’ Wide
G	Setback	12’ Min., All categories.		
C & D	Corner Clearance and Driveway Connection Spacing	See connection spacing in ***Tables 201.3.2*** and ***201.3.3***		
Flush Shoulder Roadways				
W	Connection Width	12’ Min 24’ Max	24’ Min 36’ Max	24’ Min 36’ Max
F	Flare (Drop Curb)	N/A	N/A	N/A
R	Radial Returns (Radius)	15’ Min 25’ Std 50’ Max	25’ Min 50’ Std 75’ Max	25’ Min 50’ Std (Or 3-Centered Curves)
Y	Angle of Driveway	60°- 90°	60°- 90°	60°- 90°
S	Driveway Traffic Separator or Median	N/A	4’-22’ Wide	4’-22’ Wide
G	Setback	12’ Min., All categories.		
C & D	Corner Clearance and Driveway Connection Spacing	See connection spacing in ***Tables 201.3.2*** and ***201.3.3***		

Notes:

1. Connection Categories A, B, C, and D are defined in ***FDM 214.1.1***.
2. 2-Way refers to one entry movement and one exit movement; i.e., not exclusive left or right turn lanes on the connection.
3. Small radii may be used in lieu of flares for curbed roadways in Connection Category B when approved by the Department.
4. The Angle of Driveway for Connection Category A may be reduced with approval by the local Operations/Maintenance Engineer.
5. Design criteria for channelization islands (I) is found in ***FDM 212.13***.

Radial Returns (Radius):

6. Provide the minimum radius for low-speed roadways with driveway design vehicle of a passenger car.
7. Provide the standard radius for high-speed roadways or driveway with large design vehicles (e.g., SU-30).
8. Consider providing the maximum radius or compound curve for high-speed roadways or driveway with large design vehicle (e.g., WB-62).

Modification for Non-Conventional Projects:
Delete notes 3 and 4 from ***Table 214.3.1*** and see RFP for requirements.

214.3.1 Radius

Design criteria for radial return driveways are given by road type (curbed or flush shoulder roadways) and connection category. A range of return radii (minimum, standard, and maximum) is provided in ***Table 214.3.1***.

The minimum radii will reduce the distance for pedestrians to cross the driveway. See ***FDM 214.7*** for additional pedestrian requirements.

Use 50-foot radii for driveways intended for daily accommodation of vehicles exceeding 30 feet in length. Provide the following as necessary for safe turning movements where large numbers of multi-unit vehicles will use the connection:

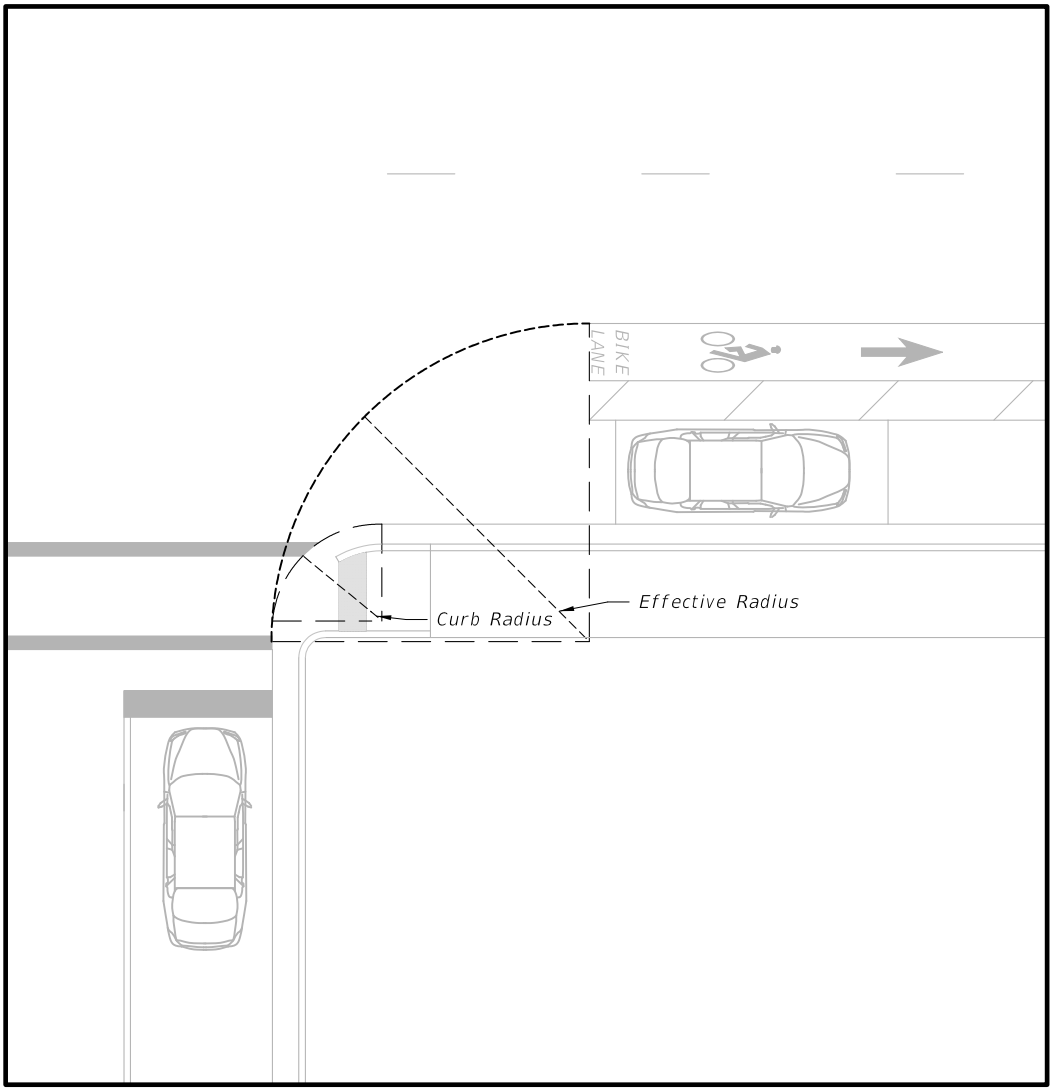
- Increased connection width
- Increased radii
- Auxiliary lanes
- Tapers
- Lane flares
- Separators
- Islands

214.3.1.1 Effective Turning Radius for Right Turns

The effective turning radius is the minimum radius needed to enter or exit a driveway, as illustrated in ***Figure 214.3.1***. Additional pavement adjacent to the travel lane (e.g., on-street parking, bike lane, bus bay) will result in the following:

- Increase the effective turning radius for the design vehicle
- The radial return radius (curb radius) may be reduced
- The ability to use a larger design vehicle

Figure 214.3.1 Effective Driveway Radius



214.3.1.2 Designing for Trucks and Other Large Vehicles

Determine the appropriate design vehicle for each driveway. Driveways designed for large vehicle (i.e. truck and bus) movements may impact other users. The following may result when using larger driveway dimensions for truck movements:

- Some confusion for passenger car drivers
- Increased pedestrian and bicyclist exposure to vehicles

Chapter 4 in the ***FDOT Access Management Guidebook*** provides additional guidance for designing for large vehicles.

The Department will determine if an auxiliary lane is needed for safe turning movements when large numbers of multi-unit vehicles will use the connection. *See* ***FDM 214.5*** for more information on exclusive right turn lanes.

214.3.2 Driveway Width

Design criteria for driveway widths are given by Connection Category (A – D) and type of roadway (curbed or flush shoulder). Minimum and maximum driveway widths are provided in ***Table 214.3.1***. Design driveway widths based on the design vehicle and number of lanes. Consider increasing driveway width above maximum values when large numbers of multi-unit vehicles will use the connection. The Department will determine if the maximum driveway width is insufficient for safe turning movements.

Modification for Non-Conventional Projects:
Delete last sentence in above paragraph and see RFP for requirements.

Design one-way connections to eliminate unpermitted movements.

When more than two lanes in the driveway connection are required, the 36-foot maximum width may be increased to relieve interference between entering and exiting traffic which adversely affects traffic flow. These cases require documented site-specific study and design.

Consider providing pavement markings to guide drivers exiting or entering a driveway.

214.3.3 Angle of Driveway

The angle of driveway (Y) influences safety and operation of the driveway. It is to be as close to 90 degrees as practical. Design values for angle of driveway are in ***Table 214.3.1***. Angles of driveways at the lower end of the allowable range should be avoided for the following reasons:

(1) Heavy skew angles increase the driveway crossing length, exposing vehicles, pedestrians, and cyclists to conflicting traffic streams for longer periods of time.

(2) The road user's sight angle to the crossing leg becomes restricted due to the skew, making it difficult to see conflicting vehicles and to perceive safe crossing gaps.

(3) Turning movements are difficult because of the skew. Additional pavement may be necessary to accommodate the turning of large trucks.

(4) Turning movements or positioning may be confusing and require additional channelization.

(5) Increased open pavement areas of highly skewed driveways increase construction and maintenance costs.

214.3.4 Driveway Traffic Separator and Channelization Island

Width requirements for driveway traffic separators are provided in ***Table 214.3.1***. For triangular channelization islands, see ***FDM 212.13*** for criteria and information.

214.3.5 Driveway Length

Driveway length is measured from the edge of roadway traffic lane or bicycle lane to the first conflict point; including the distance to the R/W and the setback (G) to a structure. The setback to a structure is measured from the R/W line to the structure as shown in ***Figure 214.1.1*** (see ***Table 214.3.1*** for minimum requirements).

Driveway length and size must accommodate all vehicular queuing, maneuvering, and parking beyond the R/W line. Except for vehicles stopping to enter the highway, the portion of the driveway within the Department R/W must be used only for moving vehicles entering or leaving the highway.

The term driveway length as used in this manual may also be referred to as throat length in other manuals.

214.3.6 Driveway Location

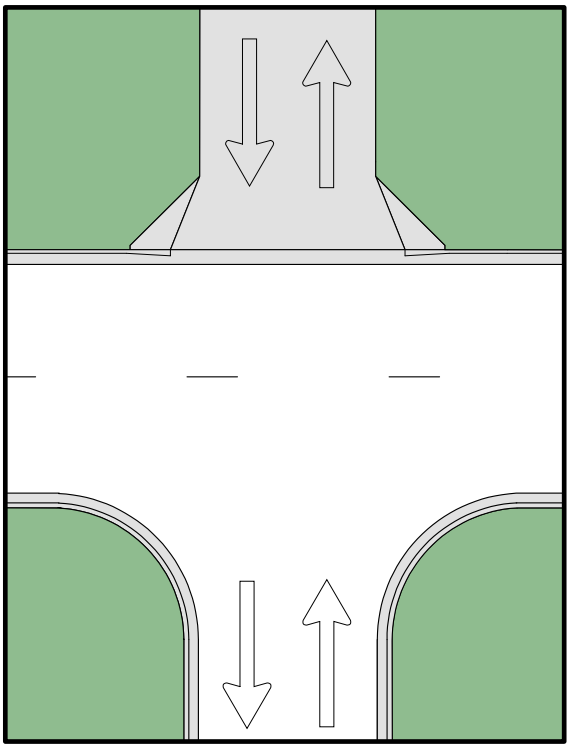
Driveway locations impact the safety and operation of the roadway. Closely-spaced driveways increase conflict points and may impede the movement of traffic. Refer to the ***2011 AASHTO Green Book, Section 9.11.6*** for additional information. Consider the location of driveways in relation to the following:

- Signalized intersections
- Un-signalized connections
- Limited Access interchange ramps
- Roundabouts

Requirements for driveway spacing and corner clearance are provided in ***FDM 201.3*** (connection spacing in ***Tables 201.3.2*** and ***201.3.3***) and shown in ***Figure 214.1.1***. In addition to corner clearance requirements, driveways should be located outside of the functional areas of adjacent intersections, where practical. The functional area of an intersection is defined in ***FDM 212.4***.

Align corresponding connection through lanes where a driveway is intended to align with a connection across the highway as shown in ***Figure 214.3.2***.

Figure 214.3.2 Aligned Through Lanes



214.3.6.1 Interchange Areas

Access Management on a crossroad at an interchange is critical for the efficient operation of an interchange. Provide adequate connection spacing along the crossroad at an interchange for the following:

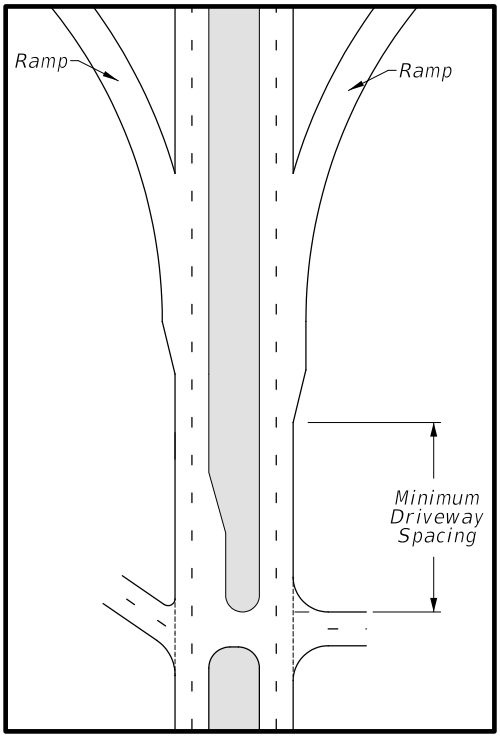
- To minimize spillback on the ramp and crossroad approaches to the ramp terminal
- Provide adequate distance for crossroad weaving
- Provide space for merging maneuvers
- Provide space for storage of turning vehicles at access connections on the crossroad

Arterial or collector roadways within 1,320 feet of interchange ramps are areas of special concern (see ***Figure 214.3.3***). ***Florida Administrative Code, Rule 14-97*** requires the following minimum driveway spacing from the ramp taper furthest from the interchange:

- 440 feet on roadways with posted speeds $\leq$ 45 mph
- 660 feet on roadways with posted speeds $\geq$ 50 mph
- 1,320 feet on Access Class 2 Facilities with posted speeds $\geq$ 50 mph

These requirements should be applied in accordance with District procedures for implementing the Rule, and should not be confused with the minimum requirements for limited access R/W.

Figure 214.3.3 Driveway Locations in Interchange Area



214.3.6.2 Roundabouts

Providing driveway access to a roundabout may be considered only when there are no other reasonable alternatives. Driveways introduce conflict to roundabout operations and increase the likelihood of wrong-way movements. Direct driveway connections must meet the following:

- Design Connection Category B, C, and D driveways as a roadway approach leg, including a splitter island.
- Connection Category A driveways are only allowed on single-lane, low-volume roundabouts. Design Connection Category A driveways as flared connections to provide a visual indication that they are not roadways.
- Provide a means for vehicles to enter the roundabout moving forward; i.e., not backing out of the driveway. This is more critical for Connection Category A driveways where unfamiliar drivers may need to turn around in the driveway.
- Meet the required intersection sight distance (see ***FDM 212***).

See ***FDM 213*** for roundabout criteria and information.

214.4 Driveway Vertical Geometry

The driveway profile defines the vertical geometry for constructing a driveway. The following will impact the design of driveway profiles:

- Roadway type (curbed or flush shoulder)
- Context classification
- Commercial or residential use
- Drainage accommodation
- Utility considerations
- Design speed of roadway (affects steepness of driveway)
- Design vehicle
- Available R/W

Design driveway grades with the following maximum values:

- 10% for commercial
- 28% for residential

Design driveways to avoid ponding and erosion. Drainage requirements are in Chapters 2 and 3 of the ***FDOT Drainage Manual***.

214.4.1 Driveway Profile on Curbed Roadways

Requirements for driveway profiles connected to curbed roadways are provided in ***Figure 214.4.2, Table 214.4.1,*** and ***FDM 113.2.2***.

Slopes and lengths of flared driveways depend on roadway geometry, design vehicles, and available R/W. Flared driveways are classified as General, Marginal, or Adverse and are described as follows:

General Applications

These can accommodate representative standard passenger vehicles, and general applications can also accommodate representative standard trucks, vans, buses, and recreational vehicles operating under normal crown and superelevation conditions. Standard pavement cross slopes and superelevation tables are provided in ***FDM 210***.

Marginal Applications

These can cause overhang drag for a fully-loaded representative standard passenger vehicle when the driveway is located on the low side of a fully-superelevated roadway.

Adverse Applications

These can cause vehicles to drag or slow down, and are typically used on very low speed (design speed ≤ 35 mph) roadways. This application's slopes can cause overhang drag for representative standard passenger vehicles under fully-loaded conditions. The steeper slopes can impede traffic flow by causing drivers leaving the roadway to excessively slow or pause.

Figure 214.4.1 illustrates a comparison between each application. Details for these applications are provided in ***Standard Plans, Index 522-003***.

Flared driveways may not accommodate vehicles with low beds, undercarriage, or appendage features. Use site-specific flare designs or Connection Category C and D designs for these vehicles.

Projects that require the reconstruction of an existing commercial driveway may exceed 10% grade when both of the following conditions are met:

- Documentation that an adverse roadway operational or safety impact would not result from the proposed grade is provided; and,
- Approval by District Design Engineer is obtained.

Modification for Non-Conventional Projects:
Delete the above paragraph and see RFP for requirements.

NCHRP Report 659, Guide for the Geometric Design of Driveways contains additional driveway profile information and guidance.

Figure 214.4.1 Comparison of Applications for Flared Driveway Connection

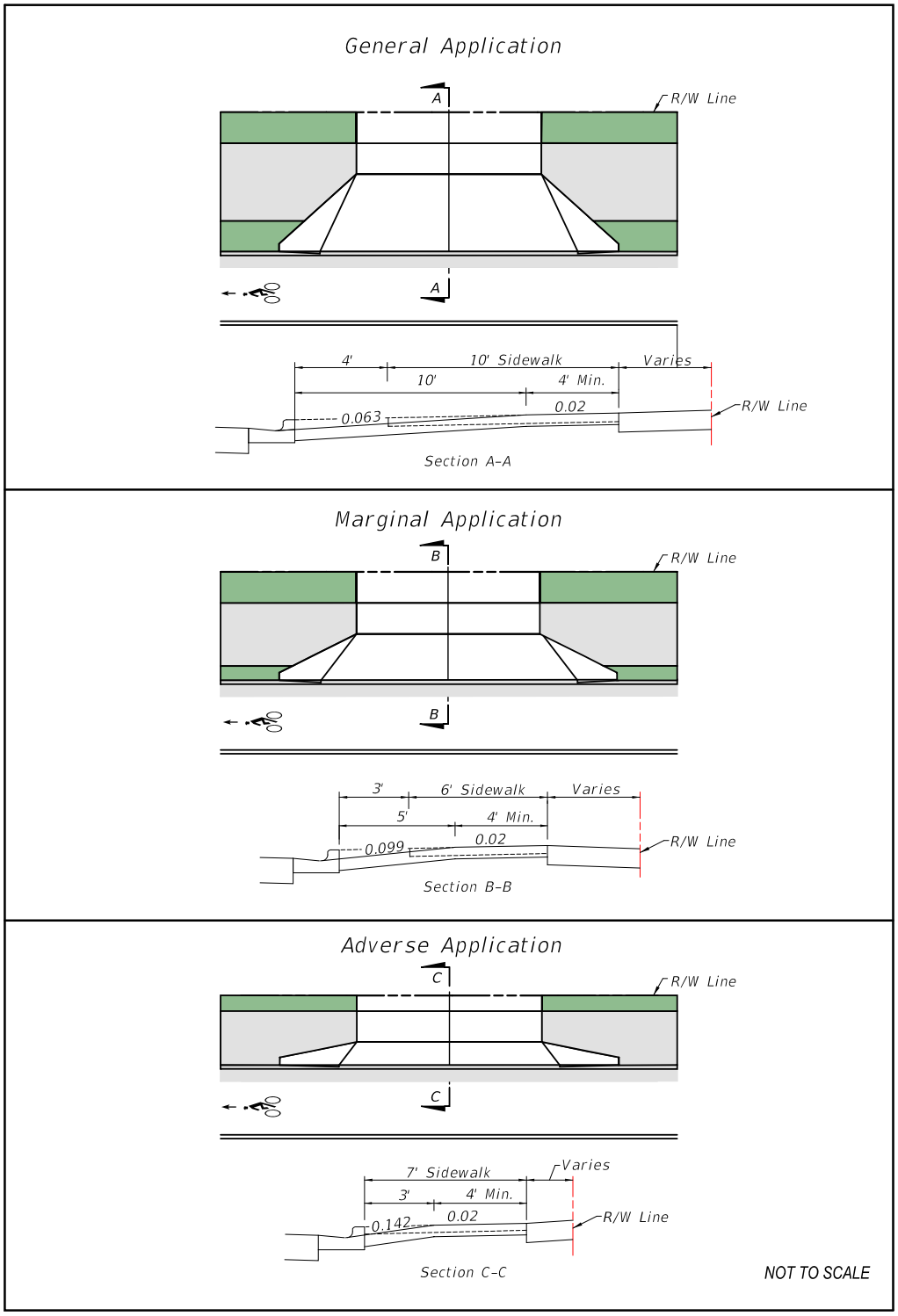
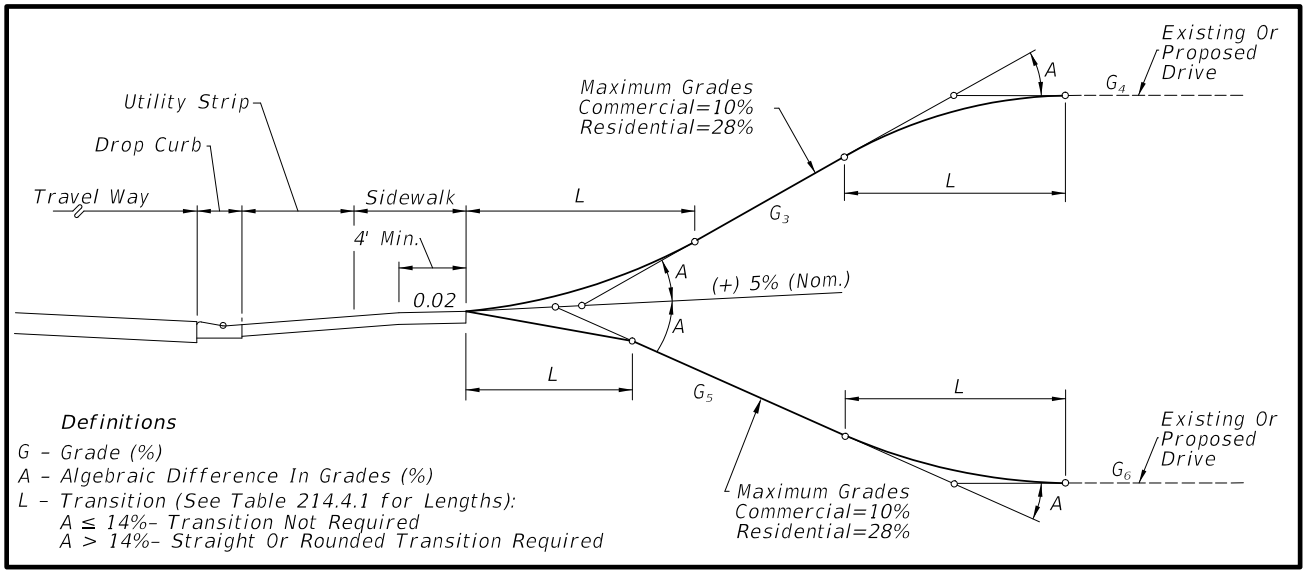


Figure 214.4.2 Curbed Roadway Driveway Profiles



214.4.2 Driveway Profile on Flush Shoulder Roadways

Requirements for driveway profiles connected to flush shoulder roadways are provided in ***Figure 214.4.3*** and ***Table 214.4.1***. Two profile options are included in ***Figure 214.4.3***. Option 1 is intended for locations where roadway, driveway taper, and auxiliary lane stormwater runoff volumes are relatively large. Option 2 is intended for locations where the runoff volumes are relatively small or there is no roadside ditch.

Slope or crown the transition (L) nearest the roadway to direct stormwater runoff to the roadside ditch.

Provide driveway profile grades adjacent to superelevated roadways (see G2 in ***Figure 214.4.3***) with the slopes and break-overs shown in ***Figure 214.4.4***.

Figure 214.4.3 Flush Shoulder Roadway Driveway Profiles

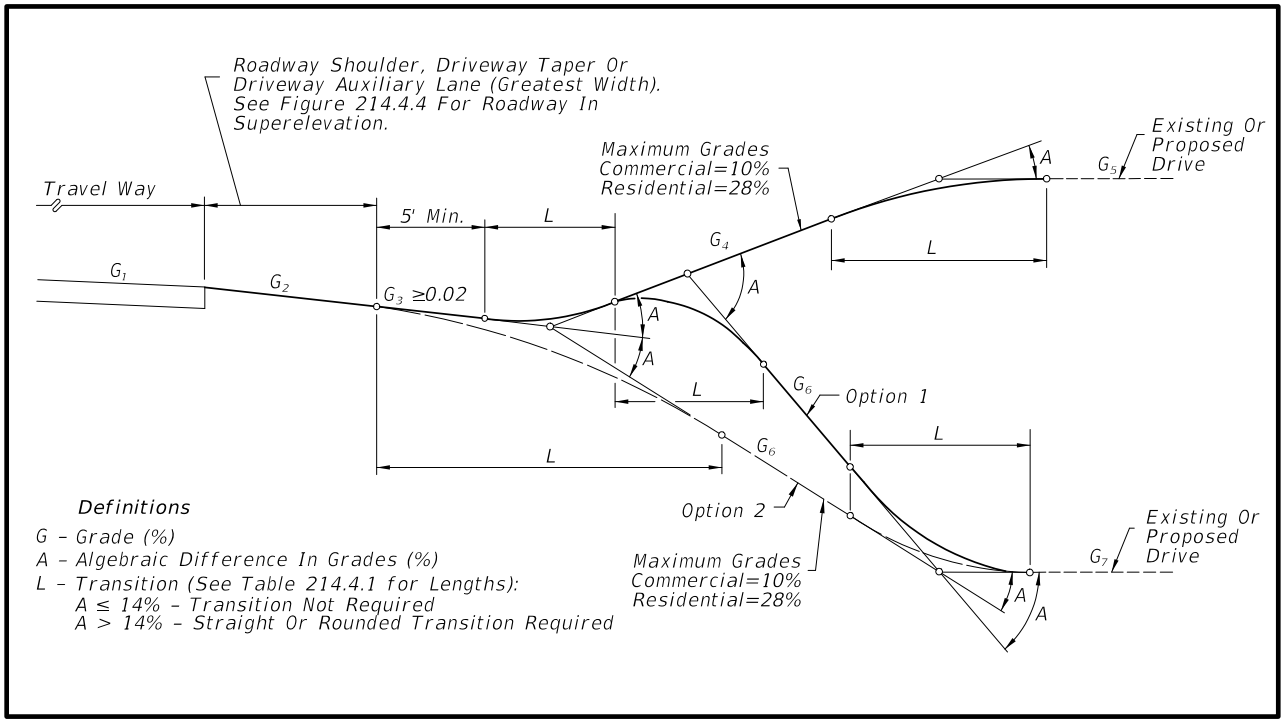


Figure 214.4.4 Driveway Slope for Flush Shoulder Roadway in Superelevation

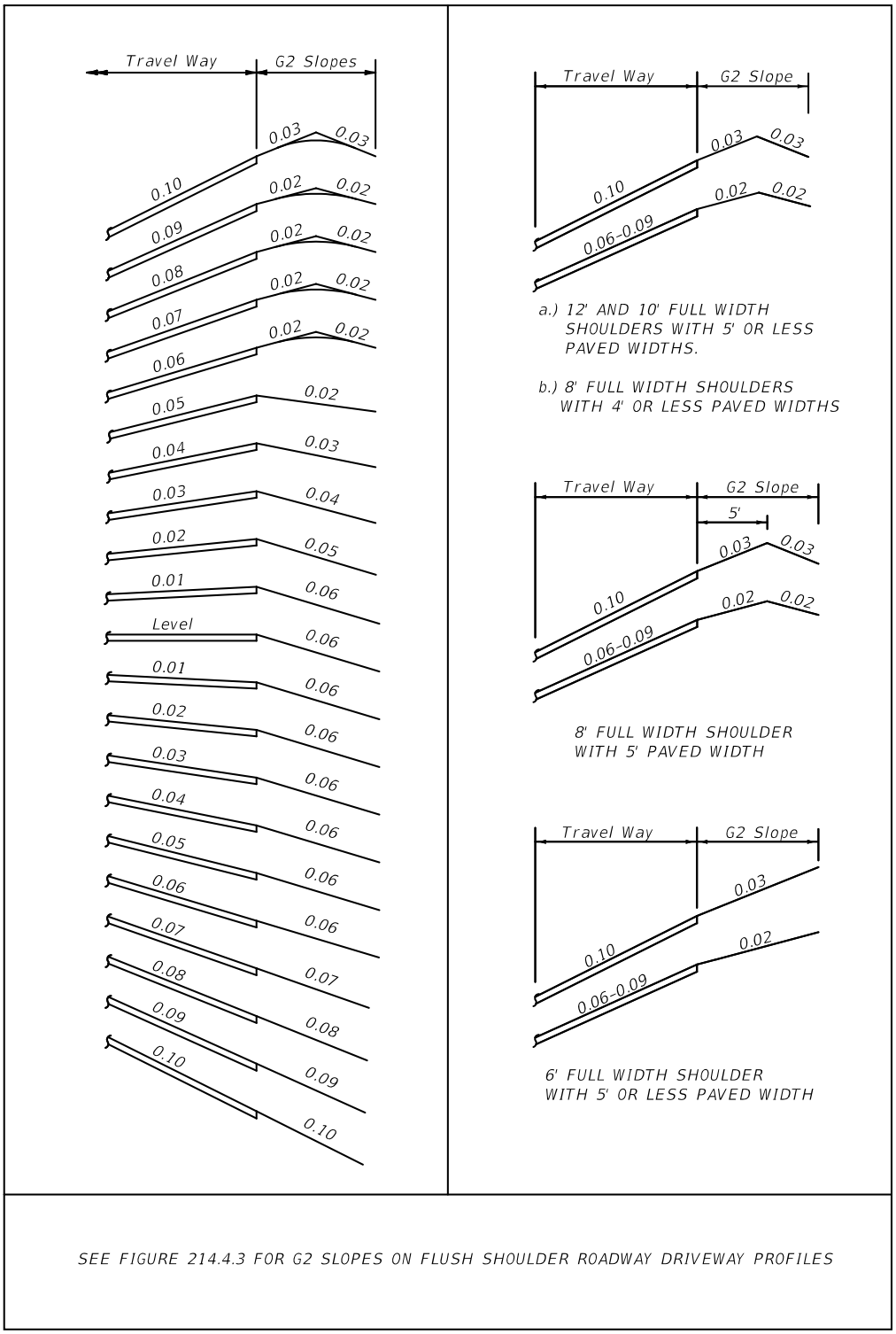


Table 214.4.1 Typical Driveway Profile Transition Lengths

Lengths (L) (Feet)								
A	Crests				Sags			
	Straight		Rounded		Straight		Rounded	
	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum
6-13%	3	0	5	0	3	0	5	0
14%	3	0	10	0	3	0	10	0
15%	3	2.5	10	3	5	3	10	5
16%	5	3	10	4	6	4	10	6
17%	6	3.5	10	5	8	5	10	7
18%	6	4	10	6	9	6	10	8
19%	7	4.5	10	7	11	7	12	9
20%	8	5	11	8	12	8	13	10
21%	9	5.5	12	9	13	8.5	14	11
22%	10	6	13	10	14	9	16	12
23%	10	6.5	14	10.5	14	9.5	16	12.5
24%	11	7	15	11	15	10	17	13
25%	12	7.5	15	11.5	16	10.5	18	13.5
26%	12	8	16	12	17	11	18	14
27%	13	8.5	17	12.5	17	11.5	19	14.5
28%	14	9	17	13	18	12	20	15
29%	N/A	N/A	22	14	N/A	N/A	21	17
30-31%	N/A	N/A	23	15	N/A	N/A	22	18
32-33%	N/A	N/A	24	16	N/A	N/A	23	20
34-36%	N/A	N/A	26	17	N/A	N/A	25	21
37-38%	N/A	N/A	27	18	N/A	N/A	26	22
39-41%	N/A	N/A	29	19	N/A	N/A	28	24
42-43%	N/A	N/A	30	20	N/A	N/A	29	25
44-46%	N/A	N/A	32	21	N/A	N/A	31	26
47-48%	N/A	N/A	33	22	N/A	N/A	32	27
49-51%	N/A	N/A	34	23	N/A	N/A	34	28
52-54%	N/A	N/A	36	24	N/A	N/A	35	30
55-56%	N/A	N/A	37	25	N/A	N/A	36	31

Notes:

1. Rounded: The following types of curvature may be selected: circular, parabolic, or spline.
2. Provide the desirable length. When the desirable length cannot be attained, provide the greatest attainable length possible, but not less than the minimum values.

214.5 Right-Turn Lanes

Exclusive right-turn lanes at unsignalized driveways can be used to reduce rear-end collisions, increase capacity, and reduce differentials in speed. Vehicles can wait in a right-turn lane for pedestrians to cross the driveway without impeding the flow of through traffic. Consider right-turn lanes into driveways with high peak hour right-turn volumes on high speed roadways.

Design right-turn lanes according to ***FDM 212.14***.

214.6 Sight Distance at Driveways

Provide intersection sight distance (per ***FDM 212.11***) on roadways with design speeds of 40 mph and higher. When intersection sight distance cannot be met on very low speed (design speed ≤ 35 mph) roadways, provide the greatest sight distance possible, but not less than minimum stopping sight distance values in ***FDM 210.11.1***.

214.7 Pedestrian Accommodations for Driveways

Provide a minimum 4-foot-wide crossing with a maximum cross slope of 2% for unsignalized radial return driveways where sidewalk is required or provided. Additional requirements for crosswalks is in ***FDM 222.2.3***. Additional requirements for pedestrian facilities are in ***FDM 222*** and the ***Standard Plans, Indexes 522-001*** and ***522-002***.

214.8 Permitting

New or modified driveways associated with new or expanded developments must be permitted in accordance with the ***Rule 14-96***, ***F.A.C.*** Permitted or grandfathered connections modified as part of a Department construction project, and not due to a significant change (as defined in Rule 14-96, F.A.C.), do not require a permit.

The ***FDOT Drainage Manual*** and ***FDOT Drainage Connection Permit Handbook*** provides information on National Pollutant Discharge Elimination System (NPDES) requirements.

The ***FDOT One Stop Permitting*** website has additional information and online permit application.